1. A method of making a mold from shape memory materials for manufacturing castable composite parts with resins which are solidified within said mold by application of a curing temperature, said method comprising the steps:

a) providing said shape memory material with a glass transition temperature which exceeds said curing temperature;

b) processing said shape memory material into a memorized shape; and

c) deforming said shape memory material from said memorized shape into a desired mold shape.

2. The method of claim 1 wherein said shape memory material is a shape memory alloy.

3. The method of claim 1 wherein said shape memory material is a shape memory polymer.

4. The method of claim 1 wherein said processing of said shape memory material is by die casting.

5. The method of claim 1 wherein said processing of said shape memory material is by solvent casting.

6. The method of claim 1 wherein said processing of said shape memory material is by extrusion.

7. The method of claim 1 wherein said processing of said shape memory material is by molding and annealing.

8. The method of claim 1 wherein said deforming of said shape memory material is by draping.

9. The method of claim 1 wherein said deforming of said shape memory material is by vacuum forming.

10. The method of claim 1 wherein said deforming of said shape memory material is by computer aided mechanical technology.

11. The method of claim 1 wherein said deforming of said shape memory material is by stamping.

12. The method of claim 11 wherein said stamping of said shape memory material is performed with said shape memory material below said glass transition temperature.

13. The method of claim 11 wherein said stamping of said shape memory material is performed with said shape memory material above said glass transition temperature.

14. The method of claim 1 wherein said shape memory material comprises an embedded thermal energy generation means.

15. The method of claim 14 wherein said thermal energy generation means comprises an electrical conductor.

16. The method of claim 14 wherein said thermal energy generation means comprises thermally conductive fibers.

17. A method of ejecting a molded castable composite part from a mold which includes a generally concave inner surface, said method comprising:

a) providing a processed shape memory material, having a glass transition temperature, deformed to replicate said generally concave inner surface of said mold;

b) inserting said deformed shape memory material into said mold such that said shape memory material is proximate said generally concave inner surface;

c) injecting a resin into said mold such that said resin is separated from said generally concave inner surface of said mold by said shape memory material and solidify said resin; and

d) elevating said shape memory material above said glass transition temperature such that said shape memory material is induced to relax to a memorized shape from said deformed shape.

18. The method of claim 17 wherein said memorized shape is a substantially flat sheet.

19. The method of claim 17 wherein said memorized shape is generally an inverted shape with respect to said deformed shape.

20. The method of claim 17 wherein said shape memory material comprises an embedded thermal energy generation means.

21. The method of claim 20 wherein said thermal energy generation means comprises an electrical conductor.

22. The method of claim 20 wherein said thermal energy generation means comprises thermally conductive fibers.

23. A method of making a mold for casting a castable composite part, said method comprising:

a) providing a film comprising a SMP and having a upper and lower surface;

b) providing a form having a upper and lower surface, the upper surface of the form having a molded area; and

c) placing the lower surface of the film onto the upper surface of the form such that the film conforms to the molded area thereof.

24. The method of making a mold in claim 23 wherein the film in step c) is placed onto the upper surface of the form under vacuum and the form and film are exposed to the atmosphere such that the film conforms to the molded surface.

25. The method of making a mold in claim 23 wherein the SMP is polynorbornene based.

26. The method of making a mold in claim 23 further comprising step d) providing a heat source, the heat source being in thermal communication with the film.

27. A mold for casting a castable composite part, the mold having shape memory properties comprising:

a form having a upper and lower surface, the upper surface comprising a molded area, and

a film comprising a SMP having a lower surface and a upper surface, the lower surface of the film being in direct contact with and conforming to the upper surface of the form.

28. The mold from claim 27 wherein the SMP is polynorbornene based.

29. The mold from claim 27 further comprising a heat source, the heat source being in thermal communication with the film.

30. A method for imparting a desired contour to a substrate, the method comprising:

a) providing a film comprising a SMP and having a upper and lower surface, the lower surface having surface relief features;

b) providing a part to be replicated having a upper and lower surface;

c) bonding the lower surface of the film to the upper surface of the substrate;

d) deforming the surface relief features; and

e) selectively heating the SMP to impart a desired contour to the substrate.

31. The method for imparting a desired contour to a substrate in claim 30 wherein the heating in step e) is provided by a laser.

32. The method for imparting a desired contour to a substrate in claim 30 wherein the heating in step e) is provided by a spatial light modulator.

33. The method for imparting a desired contour to a substrate in claim 30 wherein bonding in step c) is achieved by using an adhesive containing a laser-absorbing dye.

34. The method for imparting a desired contour to a substrate in claim 30 wherein the SMP is polynorbornene based.

35. The method for imparting a desired contour to a substrate in claim 30 wherein the upper surface of the film is optically smooth.

36. The method for imparting a desired contour to a substrate in claim 30 wherein the upper surface of the film is coated with a reflective material.

37. The method for imparting a desired contour to a substrate in claim 30 wherein the substrate is selected from the group consisting of a mirror, glass, and a lens.

38. The method for imparting a desired contour to a substrate in claim 37 wherein selectively heating in step e) compensates for the optical aberrations of the

substrate.

39. The method for imparting a desired contour to a substrate in claim 30 further including after step a) and prior to step b) providing a heat source, the heat source being in thermal communication with the SMP.

40. A method of making a mold for a castable composite part comprising:

a) providing a castable composite part;

b) providing a SMP, said SMP being molded around said castable composite part;

c) removing said SMP from said castable composite part to form a mold thereof.

41. The method of making a mold in claim 40 further comprising after step b) and prior to step c) quenching said SMP to retain the shape of said castable composite part.

42. The method of making a mold in claim 40 wherein the SMP is polynorbornene based.

43. The method of making a mold in claim 40 wherein the castable composite part is one of an automotive, mechanical, and electrical part.

44. A method for casting a castable composite part comprising:

a) providing a mold having a molded area;

b) providing a SMP material, said SMP being in a flowable form to fill said molded area;

c) filling said mold with said SMP material;

d) quenching said SMP material to retain the shape of said molded area.

45. The method for casting a castable composite part in claim 44 wherein said mold comprises a SMP.

46. The method for casting a castable composite part in claim 44 wherein said SMP is polynorbornene based.

47. The method for casting a castable composite part in 44 wherein said mold is one of a castable and composite lay-up mold.

48. A method of ejecting a molded castable composite part from a mold which includes a generally convex outer surface, said method comprising:

a) providing a processed shape memory material, having a glass transition temperature, deformed to replicate said generally convex outer surface of said mold;

b) inserting said deformed shape memory material into said mold such that said shape memory material is proximate said generally convex outer surface;

c) injecting a resin into said mold such that said resin is separated from said generally convex outer surface of said mold by said shape memory material and solidify said resin; and

d) elevating said shape memory material above said glass transition temperature such that said shape memory material is induced to relax to a memorized shape from said deformed shape and said part is separated therefrom.

49. A method of withdrawing a shape memory material mandrel from within a composite part, wherein said method comprises:

a) providing a processed shape memory material, having a glass transition temperature, deformed to replicate the interior of said part;

b) filament winding a resin soaked fiber around said deformed shape memory material and curing said resin; and

c) elevating said shape memory material above said glass

transition temperature such that said shape memory material is induced to relax to a memorized shape from said deformed shape such that said relaxed shape memory material is removable from within said part.

50. A method of manufacturing a shape memory material mandrel for manufacturing a composite part, wherein said method comprises:

a) providing a processed shape memory material having a first outer dimension in its memorized shape; and

b) deforming said processed shape memory material by inflating to a second outer dimension which exceeds said first outer dimension.